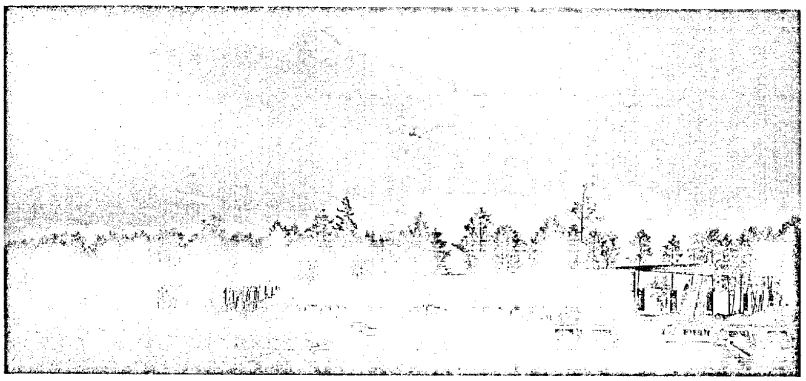
# MECHANICAL PRODUCTS BUILDING
# TEKTRONIX, INC.



Beaverton, Oregon

## Ministudy of a Project



**Architects:** Wolff Zimmer Gunsul Frasca Ritter, a 40-man firm (20 registered architects) affiliated with Nortec, Inc., a multidisciplinary engineering group of about the same size. Based in Portland with an office in San Francisco, WZGFR is the outgrowth of a practice organized in 1942 by George Wolff and Truman Phillips; today it has an annual volume in completed projects averaging $22 million in direct construction costs.
**Type of Architectural Contract:** Percentage of construction cost.
**Additional Services:** Development of a method of producing early bidding documents termed "scope drawings"* which provided the owner with a guaranteed price very early in the program; teaming up with the contractor in value engineering, trades availability and market research to determine optimum material and technique utilization; designing and engineering the project within pre-established component unit cost.
**Consultants:** Structural, mechanical and electrical design — Nortec, Inc.; field surveying — Pettijohn Engineering Co. Inc.; soils engineering — Shannon & Wilson.
**Type of Construction Contract:** Negotiated general contract (Reimers & Jolivette) with bids from a selected list of subcontractors.
**Project Costs:** Manufacturing complex — $13.31 per square foot (structural/architectural — $6.89; mechanical/electrical — $6.42); cafeteria — $26.60 per square foot.
**Program Requirements and Solutions:** Specifically, the architects were asked to:
• Design a building to house the manufacture of electronic components for cathoderay oscilloscopes and related devices; assume that unheard of and completely new processes would eventually be installed; produce an interior environment to accept varjables from quiet laboratory and office space to punch presses and die-casting machines without major revisions to structure or mechanical/electrical systems.

In very simple terms, an inner overall environment was devised, providing gross mechanical/electrical and volumetric requirements. As activities develop, they take their needs from within the space. If, at some point in time, individual needs exceed the gross system, then the latter is expanded, not the former.

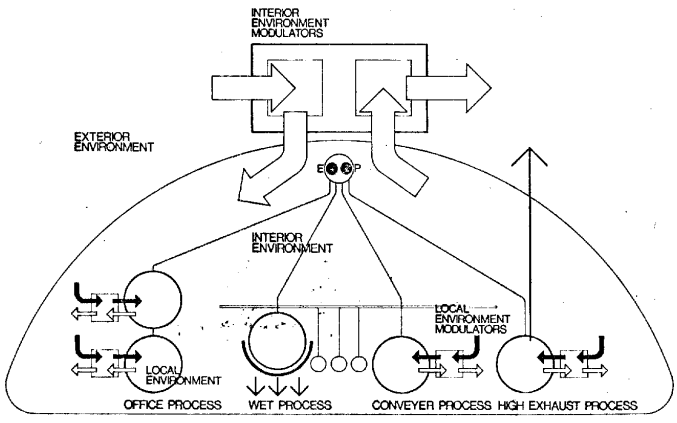
Where enclosures are required (offices, engineering, etc.), a subsystem takes its air requirements not from a direct connection but from air produced by the gross system.

To meet the needs of future overhead systems such as conveyors, or undersystems such as gravity drains, the clear height floor to structure merely has been increased; where gravity drains are required, platforms hold wet process and drains connect to spaced inlets to underfloor waste systems.

• Devise a concept compatible with the present development, a 200-acre single-owner site consisting of masonry buildings, large green areas and pleasant wooded sections; integrate the 200,000-square-foot interior with the outside, taking advantage of the campuslike setting.

An L-shaped structure was evolved to break down scale and preserve existing trees. The cafeteria and other common facilities are at the center of the L. Massive grass units placed at 50-foot intervals allow views from all areas of the complex. Brick and painted metal exterior match existing materials.

• Scale the budget to industrial construction costs.



A conventional lightweight steel frame is beefed up with a continuous center bay monitor to house capital fan equipment with indoor access. Exterior walls are of stock metal panels and cavity brick/block. Glass is gasketed to steel structural members.

Airconditioning is provided by 18 single-zone air supply units located on platforms in the monitor. Each serves an area of about 10,000 square feet by furnishing 20,000 cfm of conditioned air to the space. The units individually are capable of providing 100-percent outside air as required to offset future process exhaust system requirements.

Heating and cooling is supplied from a central plant with 350-degree hot water and 42-degree chilled water. The monitor serves as a raceway for compressed air and process cooling water mains and also provides space for future process exhaust fans and specialized process equipment.

Electrical power (480/277 volts) is distributed throughout the building by means of a 1,600-amp bus duct located in the monitor split into four independent systems.

Lighting is furnished by mercury vapor fixtures mounted 18 feet above the floor, spaced to offer a minimum light level of 150 footcandles with minimal shadowing.

• Complete the structure within 12 months from start of design. (If this were not possible, costly moves would have to be made. However, the owner would not commit to beginning the project without knowing ultimate costs which had to fall within normal prices for industrial facilities — that is to say, an open-ended time/materials construction program was not acceptable.)

Preliminary conferences were held with area contractors, subcontractors and suppliers to explore the feasibility of such a program. It was determined that it would be feasible if 1) the architects could produce bidding documents three months after start of design, 2) the owner would commit to site preparation early and 3) components, stock or special design, would be limited by availability and delivery time (*see* Fast Track Schedule for month-to-month accomplishments and Comparative Time Schedules.)

**Special Benefits to the Owner:** The start-of-design to move-in time was reduced by six months; the owner had in hand a fixed price and fixed time schedule in less than four months after the start of site selection; the project cost as finally established was 10.5 percent below the accepted budget; the structural/mechanical design solution yielded optimum flexibility without committing to initial high capital costs and without waiting for process design.

**Architects' Comments:** The type of response to this project is a logical one to today's commercial/industrial client, although it does imply more responsibility for the architects and a very close rapport among them, engineers and contractors. Serious practitioners must gear up to the job or it will be done by others. Most important of all, traditional knowledge and abilities in design must be turned to the new demands so that each completed work not only meets schedule and budget but also employs the best architectural and environmental qualities that can be achieved within those limitations. □